



New Hampshire Geological Survey's Annual Geologic Mapping Workshop 2013

Tuesday April 16, 2013

9:00 AM – 12:30 PM*

NHDES Auditorium, NHDES, Concord

29 Hazen Drive, Concord, New Hampshire 03302-0095

Public Session Agenda

8:30 – 9:00 AM **Coffee and Poster Session in Anteroom****

9:00 – 9:15 **Welcome and NHGS Program Update**

Rick Chormann, NH State Geologist – Programmatic Update

Guest speakers:

9:15 – 9:45

Joe Kopera, Massachusetts Geological Survey – “A Manifesto for the Modern Geologic Mapper.” (modified from House P.K., Clark, R.J., and Kopera, J.P., in review, Overcoming the Momentum of Anachronism: Geologic Mapping in the 21st Century: GSA Memoir XX)

The practice of geologic mapping is undergoing methodological and conceptual transformation. Profound changes in digital technology in just the past 10 years have immutable potential to impact all aspects of geologic mapping. The future of geologic mapping as a relevant scientific enterprise depends on widespread adoption of new technology and philosophies about the collection, meaning, and utility of geologic map data. It is essential that the geologic community redefine the primary elements of the traditional paper geologic map by improving the integration of field and office procedures with the new ways to record, manage, share, and visualize a map's underlying data. A modern digital geologic mapping model can enhance scientific discovery and collaboration, meet elevated expectations of modern geologic map users, and accommodate inevitable future changes in technology.

This talk will highlight the new technologies being utilized, how they change the definition of a map and the practice of map construction, and the challenges (and solutions) posed by both the technology itself and widespread anachronisms within the broader geologic community.

9:45 – 10:00

Neil Olson, New Hampshire Geological Survey – “Through Thick and Thin: Depth to Bedrock Mapping in Two New Hampshire Watersheds.” Depths to bedrock have been estimated for entire HUC8 watershed areas based on geostatistical analysis of well logs and outcrop locations. A map for the Winnepesaukee Basin was developed using recently georeferenced well data, and the previously completed Piscataqua Basin was validated using newly completed wells. These isopach maps provide useful information about a critical hydrogeologic boundary that profoundly affects the movement and

storage of subsurface water resources, the feasibility of ground source heat pump installations, and the costs associated with new well construction.

10:00 – 10:15 **Peter Thompson, University of New Hampshire – “Overview of Soapstone Deposits in New Hampshire.”** Report of results from CO₂ sequestration study, including maps, mineralogy and geochemistry. Potential for sequestration was evaluated from estimates of volume, density, and wt% MgO. Samples from most of the deposits will be available for inspection.

10:15 – 10:40 **Marjorie Gale, Vermont Geological Survey – “The 2011 Bedrock Geologic Map of Vermont: Highlights, Transitions, and Notes about the Journey.”** The 2011 *Bedrock Geologic Map of Vermont* is by Nicholas M. Ratcliffe, Rolfe S. Stanley, Marjorie H. Gale, Peter J. Thompson and Gregory J. Walsh with contributions by Norman L. Hatch, Jr., Douglas W. Rankin, Barry L. Doolan, Jonathan Kim, Charlotte J. Mehrtens, John N. Aleinikoff, and J. Gregory McHone. Cartography is by Linda Masonic. The map spans the careers of three State Geologists: Charles Ratte, Diane Conrad, and Laurence Becker (1995 - present). All told, nearly 100 geologists contributed to the map and many others contributed through field discussion.

The map is the result of 30 years of geologic mapping and digital technologies that support it. The 2011 map publication marks the 150th anniversary of the 1861 geologic map of Vermont and 50 year anniversary of the 1961 Centennial Geologic Map of Vermont. It is the first Vermont state map to include interpretations of geologic history based on the emergence of plate tectonic theory in the 1960s. The map showcases our present day understanding of Vermont’s geology, is a base for a new generation of earth scientists, and as a fundamental data layer, it will be used to address natural resource and environmental issues for years to come. This talk will use specific examples from the new map to show how plate tectonics and technology impacted the development of the map.

10:40 – 11:00 **Break**

Mappers’ Reports on Surficial Maps completed in 2012 for the NHGS

11:00 – 11:30 **Brian Fowler, NHGS STATEMAP volunteer - “Surficial Geologic Mapping, Carter Dome & Crawford Notch 7.5’ Quadrangles.”** Reconnaissance-level surficial mapping of these quadrangles was completed in 2012. Work in the north-central portion of the Carter Dome confirmed and further detailed earlier proposals by Goldthwait (1970) and Gerath (1978) regarding the post-Late Wisconsinan deglacial sequence in the lower Peabody River valley, and it established both the surface and subsurface areal extent of the deeply till-buried glaciolacustrine deposits there proposed to be of pre-Late Wisconsinan age (Fowler, 1999). An unusual and surprisingly thick section of heavily weathered binary granite was also found that helps support this proposal. Work in northeastern portion of the Crawford Notch developed a tentative sequence for the earliest events associated with the deglaciation of the area immediately north of the Notch that supplements the sequence of later events established to the north regarding the existence and sequential drainage of Glacial Lake Ammonoosuc, initially described by Lougee (1940) and later detailed by Thompson, et al. (1999) and Thompson and Svendsen (2013). However, these reconnaissance activities also raised many new questions and problems, fertile ground for both undergraduate and graduate theses, LiDAR and GPR studies, subsurface investigations, and cosmogenic dating. This work was completed on a

volunteer basis for STATEMAP with recruited help from students at Bates and Colby Colleges, from several “part-time” volunteers, and from the staff of the Mount Washington Observatory.

- 11:30 – 11:50 **Dan Tinkham, Emery and Garrett Groundwater, Inc. – “*Projection of Glacial Lake Franklin into the Ashland Quadrangle.*”** Glacial Lake Franklin was first postulated during mapping of the Bristol Quadrangle in 2009. Recent mapping of the Ashland Quadrangle has re-affirmed the presence of Glacial Lake Franklin and other higher temporary lake levels in the Pemigewasset River Valley.
- 11:50 – 12:10 **John Brooks, Emery and Garrett Groundwater, Inc. – “*Proto-Winnepesaukee and Squam: Deglaciation of the Winnepesaukee Basin.*”** In general, a sediment-starved glacier left behind few remnants in the shadow of the Squam Range, but surficial mapping in the Center Harbor Quadrangle has revealed a potential connection between Lake Winnepesaukee and Squam Lake that was controlled by a spillway at Weirs Beach.
- 12:10 – 12:20 **Carl Koteff, US Geological Survey (retired) – “*Surficial Geology of the Warner 7.5-minute Quadrangle.*” [Lee Wilder, NHGS presenting].** This quadrangle is exceptional because for the first time during active mapping by this author in New Hampshire, no large exposures of surficial material were observed during field work. The quadrangle has many areas of shallow bedrock that were eroded and molded by the Wisconsin ice sheet. Evidence in the Warner Village deposits begs the question of the real northern extent of glacial Lake Merrimack.
- 12:20 **Questions and closing remarks**
 Rick Chormann, NH State Geologist
- Private Working Session for NHGS Mappers in the Anteroom**
- 1:15 – 2:15 Mapping contractor meeting for those who map for the NHGS under the STATEMAP program.
- (See over)

Directions to NH Department of Environmental Services
The main offices of DES (including the New Hampshire Geological Survey)
are located at 29 Hazen Drive, Concord, NH.

From the South and West

Take I-93 north to Exit 14 turning right at the end of the exit ramp. At the third light (at top of the hill), turn left onto Hazen Drive. Turn left at sign for Health & Human Services. Visitor parking is available in front of building.

From the North

Take I-93 south to Exit 15E onto I-393. Take Exit 2 and turn left at end of exit ramp (East Side Drive). Stay to the right and turn right at light onto Hazen Drive. Turn right at sign for Health & Human Services. Visitor parking is available in front of building.

From the East

Take Route 4 west to Concord (Route 4 becomes I-393 in Concord). Take Exit 2 and turn left at end of exit ramp. Stay to the right and turn right at second light onto Hazen Drive. Turn right at sign for Health & Human Services. Visitor parking is available in front of building.

Attendance at the entire public session part of the workshop qualifies for 3.5 CEU's

Please respond by email if you plan to attend so that we can anticipate the number of attendees. If you need further information on the program or to R.S.V.P., please contact the NH Geological Survey at: geology@des.nh.gov or calling 271-1976.

Please bring photographic identification (e.g. driver's license) in order to be admitted to the DES Building. Thank you.

* NHDES employees should confirm their attendance and schedule of the workshop with their supervisors.

** Posters will be on display until the end of the public session of the workshop.